What is claimed is:

1. A digital signal processing system for processing one or more signals, comprising:

a first antenna to detect a first signal and to generate a first output signal;

a second antenna to detect a second signal and to generate a second output signal; and

a configurable matrix to process at least one of the first and second output signals, the matrix comprising:

a first amplifier having a first input and a first output, wherein the first input of the first amplifier is selectively coupled to the first antenna;

a second amplifier having a second input and a second output;

a switch having a first position coupling the first output of the first amplifier to the second input of the second amplifier, and a second position coupling the second input of the second amplifier to the second antenna;

a first analog-to-digital converter (ADC) coupled to the first output of the first amplifier; and

a second ADC coupled to the second output of the second amplifier.

2. The system of claim 1, wherein the first output of the first amplifier is coupled to the second input of the second amplifier via one or more additional amplifiers.

3. The system of claim 1, wherein the first and second signals include at least one magnetic resonance (MR) signal.

4. The system of claim 1, wherein at least one of the first and second antennas includes a receiving coil in a Magnetic Resonance Imaging (MRI) system.

5. A signal processing system for receiving and processing signals, comprising:

a first antenna to detect a first signal and to generate a first output signal;

a second antenna to detect a second signal and to generate a second output signal; and

a configurable matrix receiver to process at least one of the first and second output signals, comprising:

a first amplifier having a first input and a first output, wherein the first input of the first amplifier is selectively coupled to the first antenna;

a second amplifier having a second input and a second output;

a switch having a first position coupling the first output of the first amplifier to the second input of the second amplifier, and a second position coupling the second input of the second amplifier to the second antenna;

a first analog-to-digital converter (ADC) coupled to the first output of the first amplifier to generate a first digital signal;

a second ADC coupled to the second output of the second amplifier to generate a second digital signal; and

a digital signal processor (DSP) to select a digital signal from among the first digital signal and the second digital signal.

6. The system of claim 5, further comprising at least one additional antenna.

7. The system of claim 5, wherein the DSP receives the first and second digital signals, selects a one of the digital signals having a lowest distortion, and corrects for lack of phase coherence and differing gain in the digital signals, whereby the selected digital signal remains normalized with respect to others of the digital signals when the others are selected.

8. The system of claim 5, wherein the DSP minimizes quantization error by selecting a digital signal with the highest gain that does not cause saturation of an input of a corresponding one of the ADCs at any point of a single phase encoding level.

9. The system of claim 5, wherein at least one of the ADCs has respective overflow flags and the DSP is further configured such that it selects the one of the digital signals responsively to the overflow flags.

10. The system of claim 5, wherein the DSP is configured to select the one of the digital signals responsively to a lookup table correlating maximum expected analog resonance signal levels with corresponding ones of said digital signals to be selected.

11. The system of claim 10, wherein the maximum expected analog resonance signal levels each corresponds to a particular phase encoding level.

12. The system of claim 10, wherein the look-up table is configured to indicate a one of the digital signals for selection which provides a highest gain factor such that amplification of the analog resonance signal does not over-saturate an input of a corresponding one of the ADCs.

13. The system of claim 5, further comprising at least one digital down-converter connected between an ADC and the DSP.

14. The system of claim 13, wherein the digital down-converter comprises a multiplier.

15. The system of claim 14, wherein the digital down-converter further comprises a decimator to decimate an output of the multiplier.

16. A signal processing system for receiving and processing one or more signals, comprising:

a plurality of antennas to receive the signals and generate output signals;

a configurable matrix receiver coupled to receive and process the output signals from the antennas, the configurable matrix receiver comprising:

a plurality of channels, wherein each channel comprises an amplifier having an input, an output and a respective gain, and an analog-to-digital converter (ADC) coupled to the output of the amplifier; and

a plurality of switches corresponding to the plurality of channels, wherein each switch has a first position coupling an output of one amplifier to an input of another amplifier, and a second position coupling an input of one amplifier to an output of an antenna; and

a digital signal processor (DSP) to receive a plurality of digital signals from the ADCs, and select a one of the digital signals.

17. A signal processing system for receiving and processing one or more signals, comprising:

a plurality of antennas to receive the signals and generate output signals;

a configurable matrix receiver coupled to receive and process the output signals from the antennas, the configurable matrix receiver comprising:

a plurality of channels, wherein each channel comprises an amplifier having an input, an output and a respective gain, and an analog-to-digital converter (ADC) coupled to the output of the amplifier; and

a plurality of switches corresponding to the plurality of channels, wherein each switch has a first position coupling an output of one amplifier to an input of another amplifier, and a second position coupling an input of one amplifier to an output of an antenna;

a digital signal processor (DSP) to receive a plurality of digital signals from the ADCs, and select a one of the digital signals; and

the DSP being further configured to correct for lack of phase coherence and differing gain in the digital signals respective of each of the channels, whereby the one of the digital signals remains normalized with respect to others of the digital signals when the others are selected.

18. A signal processing system for receiving and processing one or more signals, comprising:

a plurality of antennas to receive the signals and generate output signals;

a configurable matrix receiver coupled to receive and process the output signals from the antennas, the configurable matrix receiver comprising:

a plurality of channels, wherein each channel comprises an amplifier having an input, an output and a respective gain, an analog-to-digital converter (ADC) coupled to the output of the amplifier, and a digital down-converter that comprises a multiplier and a decimator; and

a plurality of switches corresponding to the plurality of channels, wherein each switch has a first position coupling an output of one amplifier to an input of another amplifier, and a second position coupling an input of one amplifier to an output of an antenna; and

a digital signal processor (DSP) to receive a plurality of digital signals from the digital down-converters, and select a one of the digital signals.

19. A signal processing system for receiving and processing one or more signals, comprising:

an antenna to detect an input signal and generate an output signal; and

a configurable matrix receiver to process the output signal, comprising:

a first amplifier having a first input and a first output, wherein the first input of the first amplifier is selectively coupled to the antenna;

a second amplifier having a second input and a second output;

a switch that selectively moves between a first position that couples the first output of the first amplifier to the second input of the second amplifier, and a second position that decouples the first output of the first amplifier from the second input of the second amplifier;

a first analog-to-digital converter (ADC) coupled to the first output of the first amplifier; and

a second ADC coupled to the second output of the second amplifier.

20. The system of claim 19, further comprising an additional antenna coupled to the second input of the second amplifier.

21. A magnetic resonance imaging system, comprising:

at least one magnetic field generator positioned to create a field through an imaging volume configured to receive at least a portion of a sample to be imaged;

at least one transmitting antenna positioned to apply a radio frequency signal to at least a portion of the sample within the imaging volume;

at least one receiving antenna to detect magnetic resonance signals from the sample within the imaging volume, and generate output signals;

a configurable matrix receiver coupled to receive and process the output signals from the receiving antennas, the configurable matrix receiver comprising:

a plurality of channels, wherein each channel comprises an amplifier having an input, an output and a respective gain, and an analog-to-digital converter (ADC) coupled to the output of the amplifier; and

a plurality of switches corresponding to the plurality of channels, wherein each switch has a first position coupling an output of one amplifier to an input of another amplifier, and a second position coupling an input of one amplifier to an output of a receiving antenna; and

a digital signal processor (DSP) to receive a plurality of digital signals from the ADCs, and select a one of the digital signals.

22. The system of claim 21, wherein at least one of the at least one transmitting antennas and at least one of the at least one receiving antennas are the same.

23. The system of claim 21, wherein the DSP receives the digital signals, selects a one of the digital signals having a lowest distortion, and corrects for lack of phase coherence and differing gain in the digital signals, whereby the selected digital signal

remains normalized with respect to others of the digital signals when the others are selected.

24. The system of claim 21, wherein the DSP minimizes quantization error by selecting a digital signal with the highest gain that does not cause saturation of an input of a corresponding one of the ADCs at any point of a single phase encoding level.

25. The system of claim 21, wherein at least one of the ADCs has respective overflow flags and the DSP is further configured such that it selects the one of the digital signals responsively to the overflow flags.

26. The system of claim 21, wherein the DSP is configured to select the one of the digital signals responsively to a lookup table correlating maximum expected analog resonance signal levels with corresponding ones of said digital signals to be selected.

27. The system of claim 21, further comprising at least one digital down-converter connected between an ADC and the DSP.

28. The system of claim 27, wherein the digital down-converter comprises a multiplier.

29. The system of claim 28, wherein the digital down-converter further comprises a decimator to decimate an output of the multiplier.

30. A magnetic resonance imaging system, comprising:

at least one magnetic field generator positioned to create a field through an imaging volume configured to receive at least a portion of a sample to be imaged;

a configurable matrix to process one or more magnetic resonance signals received from the sample, comprising:

a first amplifier having a first input and a first output;

a second amplifier having a second input and a second output;

a switch having a first position coupling the first output of the first amplifier to the second input of the second amplifier, and a second position decoupling the first output of the first amplifier from the second input of the second amplifier;

a first analog-to-digital converter (ADC) coupled to the first output of the first amplifier; and

a second ADC coupled to the second output of the second amplifier.

31. The system of claim 30, further comprising at least one receiving antenna to detect the magnetic resonance signals from the sample, coupled to the first input of the first amplifier.

32. The system of claim 31, further comprising at least one transmitting antenna positioned to apply a radio frequency signal to at least a portion of the sample within the imaging volume;

33. The system of claim 31, further comprising an additional receiving antenna coupled to the switch, wherein the switch is in the second position.

34. A method for conducting magnetic resonance imaging of a sample with a magnetic resonance imaging system having an imaging volume, comprising:

selecting one or more receiving antennas to receive one or more magnetic resonance signals from a sample within the imaging volume;

selectively coupling a plurality of amplifiers to the one or more receiving antennas;

selectively connecting at least two of the plurality of amplifiers to each other; and

coupling at least one analog-to-digital converter to an output of at least one of the amplifiers.

35. The method of claim 34, further comprising:

configuring the magnetic resonance imaging system to generate a field through an imaging volume;

positioning one or more transmitting antennas to apply a radio frequency signal to at least a portion of the imaging volume; and

conducting a magnetic resonance imaging procedure.